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10/593,574

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EXAMINER

LAPAGE, MICHAEL P

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/593,574 | Applicant(s) EMTMAN ET AL. | |
| | Examiner MICHAEL LAPAGE | Art Unit 4158 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 September 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20 September 2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-22 are presented for examination.

Specification

2. The abstract of the disclosure does not commence on a separate sheet in accordance with 37 CFR 1.52(b)(4). A new abstract of the disclosure is required and must be presented on a separate sheet, apart from any other text.
3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
4. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: Throughout the specification reference numbers do not properly correlate with the drawings provided for example in figure 2 it is believed "131" should actually be labeled "132". In the specification if read in logical order the believed "132" would then be another problem in that now "132" refers to two separate parts of the apparatus in Figure 1 and 2. Multiple similar errors occur

throughout the specification one other example is that "154" presented on Figure 1 does not appear to be present within the specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 6-7, 9, 12-13, 15, 17, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Nahum.

7. **As to claim 1, Nahum discloses an apparatus for measuring surface displacements, comprising:**

a light source which projects a beam of light upon a surface (Fig. 1 item 130; [0073], lines 1-8); **and**

a detector that has a number of pixels at least about 50% larger than a number used for a surface displacement measurement (Fig. 6; [0165], lines 16-24) where it is inherent that if the reference needs only one row of M pixels that would be far less than 50% of the detectors original detection area shown in figure 6.

8. **As to claim 2, Nahum discloses an apparatus where only a subset of the pixels in a pixel address window in the detector participates in a correlation calculation ([0165], lines 16-24).**

9. **As to claim 3, Nahum discloses an apparatus further comprising: a controller which determines the pixel address window as the area containing those pixels having best or sufficient correlation characteristics ([0211], lines 1-7).**

10. **As to claim 4, Nahum discloses an apparatus where the correlation characteristics include intensity characteristics and uniformity characteristics ([0165]) where the sufficient intensity is found in the peak functions and the uniformity characteristics are found in the differences between the maximum and minimum values.**

11. **As to claim 6, Nahum discloses an apparatus further comprising: a controller which identifies a correlation area in two overlapping stored images, which contains pixels which will participate in the correlation calculation ([0213], lines 1-16).**

12. **As to claim 7, Nahum discloses an apparatus further comprising a comparing circuit which performs a correlation calculation using the pixels in the correlation area ([0213]).**

13. **As to claim 9, Nahum discloses an apparatus where the light source is a source of coherent radiation, the beam spot contains a speckle pattern reflected from the surface ([0165], lines 16-24).**

14. **As to claim 12, Nahum discloses an method for measuring a surface displacement, comprising:**

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directing a beam of light from a light source onto a target surface (Fig. 1 item 130; [0073], lines 1-8);

reflecting the beam from the target surface and into a beam spot on a detector, where the detector has a number of pixels at least 50% larger than the number used in a surface displacement measurement (Fig. 2) where since no defined number of pixels for surface displacement measurement were defined then examiner is interpreting that only a small amount are required such as 2 and therefore figure 2 shows a detector with at least 50% more pixels;

determining a subset of pixels of the detector which are to be used in the surface displacement measurement ([0165], lines 16-24; [0034], lines 1-11); **and measuring a surface displacement using the subset of pixels** ([0165], lines 16-24; [0034], lines 1-11).

15. **As to claim 13, Nahum discloses a method further comprising: performing an interpolation to determine the surface displacement** ([0102], lines 8-17).

16. **As to claim 15, Nahum discloses a method where the determining step comprises determining a pixel address window, where the pixel address window includes the subset of pixels on the detector which have the best or sufficient intensity and uniformity characteristics** ([0165]) where the sufficient intensity is found in the peak functions, and the uniformity characteristics is found in the differences between the maximum and minimum values.

17. **As to claim 17, Nahum discloses a method further comprising: determining a pixel correlation area within the subset, containing pixels which will participate in a correlation calculation ([0165], lines 16-24).**

18. **As to claim 22, Nahum discloses an apparatus for measuring a surface displacement, comprising:**

means for directing a beam of light from a light source onto a target surface and reflecting the light from the target surface onto a detector (Fig. 1 items 110, 130, 160; [0073], lines 1-8; [0075], lines 6-10);

means for determining a subset of pixels on the detector within the beam spot of the light beam reflected from the surface ([0165], lines 16-24; and

means for measuring a surface displacement using a portion of the subset of pixels ([0034], lines 1-11).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

21. Claims 5, 8, 11, 16, 18-19 and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Nahum.

22. **As to claim 5, Nahum discloses an apparatus further comprising: an aperture which blocks light in the beam at an intensity less than about 80% of a maximum beam intensity** ([0086], lines 1-7) where it is obvious to one of ordinary skill in the art that if the aperture is adjustable it can be modified to reduce the intensity by 80% or less. It is then desirable to reduce the intensity of the beam to allow for a more uniform detection of the speckle interference pattern and thus a more accurate and efficient system for measuring small movements.

23. **As to claim 8, Nahum discloses an apparatus where the pixel address area is between about 200 and about 300 pixels on each side** ([0109]) where determining the number of pixels in the detector based on an average expected diameter of the speckle pattern would have been obvious to one of ordinary skill in the art. In beam

optic analysis it is always necessary to use a detector of proportional size to the incoming beam to allow for full image detection and thus an accurate measurement of the object in question.

24. As to claim 11, Nahum discloses an apparatus where the pixel address area contains pixels having a predetermined threshold intensity [i.e. peak value] and a predetermined threshold contrast [i.e. difference between sparse and peak set] compared to neighboring pixels ([0185], lines 1-10) where predetermined values of both contrast and intensity allow for efficient correlation & calculation of the speckle image. It would have been obvious to one of ordinary skill in the art to have a known value of threshold intensity and contrast to allow for efficient analysis of corresponding pixels when performing calculations with the correlation function.

25. As to claim 14, Nahum discloses an method where the subset is a pixel address window, containing between about 40000 and about 90000 pixels ([0109]) where determining the number of pixels in the detector based on an average expected diameter of the speckle pattern would have been obvious to one of ordinary skill in the art. In beam optic analysis it is always necessary to use a detector of proportional size to the incoming beam to allow for full image detection and thus an accurate measurement of the object in question.

26. As to claim 16, Nahum discloses a method where the detector has an area at least about 4 times larger than the pixel address window ([0079], lines 1-7)

where since no area is defined any arbitrary area can be defined where the detector is of a size at least 4 times larger. It would be obvious to one of ordinary skill in the art to provide a detector larger than the pixel address window since in order to calculate the window with a correlation function two offset pictures of greater size are required to further define the sought after pixel address window. In providing the biggest possible initial detector there would leave little room for any of the light to escape and not be detected for performing the correlation function leading to the pixel address window subset.

27. As to claim 18, Nahum discloses a method where the pixel correlation area contains between about 10000 and about 22500 pixels (Fig. 6 items M pixels and N pixels; [0165], lines 16-24) where the exact amount of pixels can be varied as stated in reference by M and N pixels. In beam optic analysis it is always necessary to use a detector of proportional size to the incoming beam to allow for full image detection and thus an accurate measurement of the object in question.

28. As to claim 19, Nahum discloses a method further comprising: providing an aperture which blocks light in the beam having an intensity less than a predefined threshold intensity ([0086], lines 1-7) where it is obvious to one of ordinary skill in the art that if the aperture is adjustable it can be set to any predefined threshold

intensity. It is then desirable to reduce the intensity of the beam to allow for a more uniform detection of the speckle interference pattern and thus a more accurate and efficient system for measuring small movements.

29. **As to claim 20, Nahum discloses a method where the predefined threshold intensity is less than about 80% of a maximum beam intensity** ([0086], lines 1-7) where it is obvious to one of ordinary skill in the art that if the aperture is adjustable it can be modified to reduce the intensity by 80% or less. It is then desirable to reduce the intensity of the beam to allow for a more uniform detection of the speckle interference pattern and thus a more accurate and efficient system for measuring small movements.

30. Claims 10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nahum in view of Tsikos et al. (U.S. PGPub No. 2003/0019933 A1 and Tsikos hereinafter)

Although the system disclosed in Nahum shows substantial features of the claimed invention (discussed in paragraphs above), it fails to disclose:

An apparatus where the light source is an incoherent light source, and the surface includes a scale pattern indicative of displacement [claim 10].

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An method further comprising: decoding a pattern applied to the target surface and illuminated by the beam, to determine an amount of displacement which the target surface has undergone [claim 21].

Nonetheless, these features are well known in the art and would have been obvious modifications of the method and apparatus disclosed in Nahum, as evidenced by Tsikos.

An apparatus where the light source is an incoherent light source, and the surface includes a scale pattern indicative of displacement [claim 10] ([137])

where applying a pattern on a object being translated allows accurate measurements with incoherent light.

An method further comprising: decoding a pattern applied to the target surface and illuminated by the beam, to determine an amount of displacement which the target surface has undergone [claim 21] ([137]) where applying a pattern on a object being translated allows accurate measurements with incoherent light.

Given the teaching of Tsikos, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Nahum by employing the well-known features of light analysis when using an incoherent light source. One of ordinary skill in the art would have known that incoherent light would require a predetermined pattern to reflect light off of in order to have any sort of accurate measurements when dealing in the ranges normally analyzed at an interferometric scale

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL LAPAGE whose telephone number is (571)270-3833. The examiner can normally be reached on Monday Through Friday 7:30AM-5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Benson can be reached on 571-272-2227. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael LaPage/
Examiner, Art Unit 4158

/UYEN-CHAU N LE/
Primary Examiner, Art Unit 4158